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IS : 6425 - 1971

*Indian Standard*

SPECIFICATION FOR  
DIOPTOMETER ( LENSOMETER )

UDC 535.81.08



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**INDIAN STANDARDS INSTITUTION**  
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG  
NEW DELHI 1

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AMENDMENT NO. 1 JANUARY 1980

TO

IS:6425-1971 SPECIFICATION FOR DIOPTRIC METER (LENSOMETER)

Alteration

(Page 5, clause 4.2, first sentence) - Substitute the following for the existing sentence:

'The collimator shall have a moving target graticule.'

(EDC 36)

Reprography Unit, ISI, New Delhi

# Indian Standard

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# *Indian Standard*

## SPECIFICATION FOR DIOPTOMETER ( LENSOMETER )

### 0. FOREWORD

**0.1** This Indian Standard was adopted by the Indian Standards Institution on 3 November 1971, after the draft finalized by the Optical and Mathematical Instruments Sectional Committee had been approved by the Mechanical Engineering Division Council.

**0.2** Dioptrimeter is an instrument which permits accurate setting and measurement of dioptric values, cylindrical axis, prismatic powers and centration of different types of spectacle lenses.

**0.3** The instrument consists of a collimator and telescope combination with facilities for moving the target graticule ( collimator graticule ) on a common axis in either direction. The graticule movement is graduated. When there is no test lens in position, a clear image of the target graticule is seen with the telescope adjusted for parallel rays, but when a lens under test is positioned, the target graticule goes out of focus. The graticule is moved till it is again in focus. The amount by which the graticule is shifted, is the measure of the dioptric power of the lens.

**0.4** For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960\*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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### 1. SCOPE

**1.1** This standard specifies the general and functional requirements of a dioptrimeter ( lensometer ).

### 2. TERMINOLOGY

**2.0** For the purpose of this standard, the following definitions, in addition to those given in IS : 1399-1959†, shall apply.

\*Rules for rounding off numerical values ( revised ).

†Glossary of terms used in optical technology.



## **IS : 6425-1971**

**2.1 Base** — This is either integral with the limb or hinged, and the whole instrument rests on it.

**2.2 Ink Marker** — An attachment used to mark the optical centre and the axis of orientation.

**2.3 Lens Holder** — A device to keep the lens in contact with the lens rest.

**2.4 Lens Pad** — A nonslipping stage on which a lens under test is kept.

**2.5 Lens Rest** — A metallic stage on which one edge of the lens is supported to keep it in position.

**2.6 Limb** — This term applies to the portion that holds the telescope at one end and the collimator with the target graticule and the illuminating device at the other end. This is either of fixed type or hinged type.

## **3. GENERAL REQUIREMENTS**

**3.1** Each part of the instrument shall be made of material of suitable strength and shall be suitably finished.

**3.1.1** Different parts of the instrument, as far as possible, shall be made of metals having similar thermal expansion so that its accuracy is unaffected by large variations in temperature.

**3.1.2** Coating and plating on each part shall be durable to resist discolouration, wear and rust.

**3.2** The optical parts shall be clear of fog and moulds. The optical parts shall conform to IS : 988-1959\*. The telescope shall be hermetically sealed to avoid fungus growth.

**3.2.1** The optical system shall be reasonably free from aberrations..

**3.2.2** The optical parts shall preferably be coated with antireflection coatings.

**3.3** A suitable dust-proof case shall be provided for the storage and carriage of the instrument.

## **4. FUNCTIONAL REQUIREMENTS**

**4.0** The essential parts of the instrument shall meet the following requirements.

**4.1** The telescope shall be provided with a cross-line and protector graticule and the eye-piece movement shall be graduated up to  $\pm 5$  dioptries.

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\*General requirements for optical components.



AMENDMENT NO. 2 MARCH 1983

TO

IS:6425-1971 SPECIFICATION FOR DIOPTRIC  
(LENSOMETER)

Addendum

(Page 5, clause 4.2.1) - Add the following  
new sentence at the end of the clause:

'When required by the indentor the drum may incorporate  
a dioptric scale with markings from - 20 to 0 and  
0 to + 20 dioptries.'

(EDC 36)

Reprography Unit, ISI, New Delhi, India

**4.2** The collimator shall have a moving target graticule in the form of a circle of green luminous dots. The aperture and focal length of this collimator lens shall be same as that of telescope objective.

**4.2.1** The target graticule shall be movable with the help of an external drum. The drum shall be graduated with a dioptric scale having markings from  $-25$  to  $0$  and  $0$  to  $+25$  dioptries in steps of quarter dioptries. Alternatively a built-in scale may be provided which shall be read through a telescope. The movement of the drum shall be smooth with no backlash.

**4.3** The target and telescope graticule design shall be such as to facilitate measurement of power of various types of ophthalmic lenses and for setting their axes.

**4.4** The illuminating device for the collimator shall provide proper illumination to the target graticule and shall have facility for easy replacement of the electric bulb. It shall not heat the system unduly whereby disturbing the functioning of optical and mechanical system. A window shall be provided to show that the light is on.

**4.5** The ink marker having three points shall be sturdy and long wearing. The points shall be easy to ink and shall also have facilities to lift them out.

**4.6** An ink pad shall also be provided with special marking ink.

**4.7** The lens holder shall have a release mechanism so that the lens under test may be held firmly in contact with the lens pad, when required.

**4.8** The lens pad shall be of such material so as to prevent the lens from slipping and being scratched. The lens pad shall be so positioned that the lens under test when placed on it shall be at the back focal plane of the collimator lens.

**4.9** The lens rest shall be coupled with a micrometer arrangement which shall facilitate a linear movement of 35 mm and may be graduated.

**4.10** The optical characteristics of a typical telescope shall be as under:

Magnification	3 ×
OG aperture	12.5 mm
Field of view	12°
Eye clearance	10 mm

**4.10.1** In the protractor graticule of the telescope the angular scale shall be graduated from  $0^\circ$  to  $180^\circ$  and marked at every  $30^\circ$  and the prism dioptric scale shall be graduated up to  $6^\circ$  on either side of the centre.

**4.11** The range of the instrument shall be  $\pm 25$  dioptries.

**4.12** The illuminating device shall operate on mains.

## **5. TESTS**

### **5.1 General Requirement Test**

**5.1.1** The instrument shall initially be examined for the following possible external faults:

- a) Loose, missing or damaged screws, nuts and other small parts;
- b) Scratched, broken or dirty object glass and eye lens; and deteriorations of balsam in the optical components;
- c) Damage to the telescope, limb, collimator and illuminating device; and
- d) Bent or otherwise damaged clamps.

**5.1.2** The instrument shall be checked for the following internal defects:

- a) Scratched, chipped or dirty optical parts;
- b) Damage to optical parts, graticules, deterioration of optical cements and antireflection coatings;
- c) Filming or fungus growth on the optical surfaces;
- d) Bubbles, striae and greyness, cloudiness or milky appearance on lenses;
- e) Lack of sharpness and clarity of the graticule and any dust or dirt in the field of view; and
- f) Any stray light from the interior surfaces affecting the vision.

**5.1.3** The carrying case shall be checked for the general condition and internal fittings.

### **5.2 Performance Tests**

**5.2.1** The magnification of the telescope shall be measured as per IS : 2754-1964\*. The measured value shall not differ from the specified value by more than 5 percent.

**5.2.2** The dioptric scale on the eyepiece shall be tested as per IS : 2754-1964\*. The measured value shall not differ from the specified value by more than 0.5 dioptre.

**5.2.3** The dioptric and angular graduation of the telescope and target graticules shall be tested by observing a set of lenses of known values. The measured dioptric values shall be within  $\pm 0.25$  dioptre and the angular values within  $\pm 30$  minutes of the known values.

**5.2.4** The axial movement of the target graticule shall be checked at various positions of the graticule along with the axis. It shall not deviate by more than  $\pm 3$  minutes.

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\*General requirements for optical instruments.

**5.3 Optional Tests** — When agreed to between the manufacturer and the purchaser, the following tests shall be conducted.

**5.3.1 Vibration Test** — The instrument placed in its case, shall be clamped on to a vibration table giving approximately 450 vibrations per minute with a maximum amplitude of 1.5 mm for a period of five minutes. After the test, the performance of the instrument shall remain unimpaired.

**5.3.2 Bump and Shock Test** — The test shall be carried out as per IS : 2352-1963\*. After the test, the performance of the instrument shall remain unimpaired.

## 6. MARKING

**6.1** The instrument shall be marked at a suitable place with the manufacturer's name or trade-mark and the year of manufacture.

**6.1.1** The instrument may also be marked with the ISI Certification Mark.

**NOTE** — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution ( Certification Marks ) Act, and the Rules and Regulations made thereunder. Presence of this mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard, under a well-defined system of inspection, testing and quality control during production. This system, which is devised and supervised by ISI and operated by the producer, has the further safeguard that the products as actually marketed are continuously checked by ISI for conformity to the standard. Details of conditions, under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

## 7. PACKING AND PACKAGING

**7.1** The instrument shall be placed in its case and held in position securely and there shall be no rattling.

**7.2** A bag containing adequate quantity of silica gel shall be placed inside the case.

**7.3** The case with its contents shall be locked during transit and keys attached to its handle.

**7.4** The case shall then be placed in a wooden packing case lined with waterproof paper, using dried cotton waste as cushioning material. The lid shall be screwed down.

**7.5** The package shall be marked with the description of the store, the standard symbol indicating fragile contents and the symbol 'THIS WAY UP' according to IS : 1286-1967† and the legend 'INSTRUMENT, HANDLE WITH CARE' in red.

\*Procedure for basic climatic and durability tests for optical instruments.

†Pictorial markings for handling of goods in general (first revision).

# **INDIAN STANDARDS**

**ON**

## **Optical Instruments**

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<b>1399-1959</b>	<b>Glossary of terms used in optical technology</b>
<b>1400-1960</b>	<b>Optical glass</b>
<b>2352-1963</b>	<b>Procedure for basic climatic and durability tests for optical instruments</b>
<b>2976-1964</b>	<b>Optical theodolite</b>
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<b>3686-1966</b>	<b>Student-type microscope</b>
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<b>5110-1969</b>	<b>Corneal loupe</b>
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<b>5147-1969</b>	<b>Examination lamp with bull's eye condenser ( floor model )</b>
<b>5148-1969</b>	<b>Hand magnifiers ( circular ) — 50, 75 and 100 mm</b>
<b>5204-1969</b>	<b>Research microscope</b>
<b>5415-1969</b>	<b>Code of practice for packing and packaging of optical and mathematical instruments and components</b>
<b>5695-1970</b>	<b>Spectacle lenses</b>
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<b>5750-1970</b>	<b>Sigmoidscope</b>
<b>5920-1970</b>	<b>Recommendations for the preparation of drawings for optical elements and systems</b>

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